

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : HITACHI LTD

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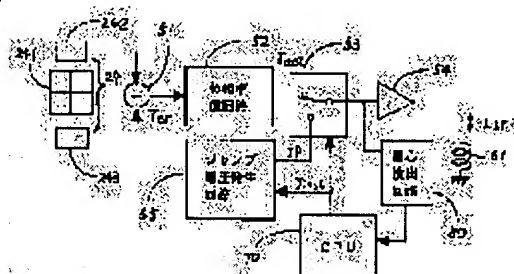
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(54) TRACK JUMP DEVICE FOR OPTICAL PICKUP AND GENERATION METHOD FOR ITS TRACKING DRIVING SIGNAL

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a track jump device, for an optical pickup, by which a track jump is performed surely and at high speed even when a spiral track on the face of an optical disk is eccentric.

SOLUTION: In a track jump device, an optical pickup 20 which can be moved in the radial direction of a disk-shaped optical disk 10 is moved to the other track from one track by an actuator. The track jump device fetches a low-frequency component by a filter from a tracking-error signal T_{er} , it generates a tracking driving signal T_{act} , it generates a jump pulse JP used to jump the optical pickup 20 with reference to the central value of a driving-signal waveform, it drives the actuator by changing over them, and it performs a track jump. In addition, an eccentricity detection circuit 80 which detects the eccentricity of the track of the optical disk 10 is installed, a changeover to the jump pulse JP is permitted by a window pulse signal WP from the circuit 80 only when the amplitude of the eccentricity is within a prescribed range, and it is possible to prevent a jump pulse due to the eccentricity of the track from being buried into the driving signal.



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DERWENT-ACC-NO: 1999-066550

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TITLE: Track jumping apparatus for recording and reproducing apparatus e.g. CD-ROM - controls switching from tracking drive signal to jump pulse according to detected eccentricity of track on recording surface of optical disk

PATENT-ASSIGNEE: HITACHI LTD[HITA]

PRIORITY-DATA: 1997JP-0119813 (May 9, 1997)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 10312549 A	November 24, 1998	N/A	007	G11B 007/085

APPLICATION-DATA:

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JP 10312549A	N/A	1997JP-0119813	May 9, 1997

INT-CL (IPC): G11B007/085

ABSTRACTED-PUB-NO: JP 10312549A

BASIC-ABSTRACT:

The apparatus has an optical pick-up (20) that forms an optical spot on the track on the recording surface of an optical disk (10) when performing tracking. An actuator is provided to move the optical pick-up radially. The optical pick-up then moves from one to the other track.

The amount of light reflected from both sides of the track is detected. A tracking drive signal is generated from a tracking error signal produced based on the difference between the amount of light reflected from both sides. A jump pulse for optical spot jump is generated from the central value of a drive signal waveform. The actuator is driven after switching from the tracking

drive signal to the jump pulse. The eccentricity of the track is then detected. The switching to the jump pulse is controlled based on the detected eccentricity of the track.

ADVANTAGE - Delay in attainment of objective position by repeating track jump is eliminated. Optical pick-up can be moved to adjacent track reliably and at high speed, thereby improving seek velocity of recording and reproducing apparatus.

CHOSEN-DRAWING: Dwg.2/7

TITLE-TERMS: TRACK JUMP APPARATUS RECORD REPRODUCE APPARATUS
CD ROM CONTROL

SWITCH TRACK DRIVE SIGNAL JUMP PULSE ACCORD DETECT
ECCENTRIC TRACK
RECORD SURFACE OPTICAL DISC

ADDL-INDEXING-TERMS:
COMPACT DISK-READ ONLY MEMORY

DERWENT-CLASS: T03 W04

EPI-CODES: T03-B02A3C; T03-N01; W04-C03B; W04-C10A;

SECONDARY-ACC-NO:
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TITLE: TRACK JUMP DEVICE FOR OPTICAL PICKUP AND
GENERATION
METHOD FOR ITS TRACKING DRIVING SIGNAL

PUBN-DATE: November 24, 1998

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HITACHI LTD N/A

APPL-NO: JP09119813

APPL-DATE: May 9, 1997

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ABSTRACT:

PROBLEM TO BE SOLVED: To provide a track jump device, for an optical pickup, by which a track jump is performed surely and at high speed even when a spiral track on the face of an optical disk is eccentric.

SOLUTION: In a track jump device, an optical pickup 20 which can be moved in the radial direction of a disk-shaped optical disk 10 is moved to the other track from one track by an actuator. The track jump device fetches a low-frequency component by a filter from a tracking-error signal Ter, it generates a tracking driving signal Tact, it generates a jump pulse JP used to

jump the optical pickup 20 with reference to the central value of a driving-signal waveform, it drives the actuator by changing over them, and it performs a track jump. In addition, an eccentricity detection circuit 80 which detects the eccentricity of the track of the optical disk 10 is installed, a changeover to the jump pulse JP is permitted by a window pulse signal WP from the circuit 80 only when the amplitude of the eccentricity is within a prescribed range, and it is possible to prevent a jump pulse due to the eccentricity of the track from being buried into the driving signal.

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CLAIMS

[Claim(s)]

[Claim 1] Track jump equipment of optical pickup in which an optical spot which said optical pickup forms in a truck on a recording surface of said disc-like optical disk with an actuator inside optical pickup prepared in radial [of a disc-like optical disk] movable characterized by providing the following carries out tracking and which it moves to other trucks from a certain truck A means to generate a tracking driving signal from a tracking error signal which detects the amount of reflected lights reflected across said truck of a light beam which carried out outgoing radiation along a truck on a recording surface of said optical disk from said optical pickup, and is generated based on the difference A means to generate a jump pulse of the shape of a pulse for making said optical spot jump to central value of said drive signal wave form A means to have a means to change the tracking driving signal concerned to said jump pulse, and to drive said actuator, and to detect eccentricity of a truck on said disc-like optical disk further A means to control a change to a jump pulse of the shape of said pulse based on eccentricity of a truck from said eccentric detection means

[Claim 2] It is track jump equipment of optical pickup characterized by being constituted so that a window pulse signal which permits a change to said jump pulse for a tracking driving signal with which said eccentric detection means was generated from said tracking error signal in track jump equipment of optical pickup indicated to said claim 1 as compared with a predetermined threshold may be generated.

[Claim 3] It is track jump equipment of the optical pickup characterized by to equip said change control means with a changeover switch means which changes said tracking driving signal to a jump pulse of the shape of said pulse in track jump equipment of optical pickup indicated to said claim 2, and for said changeover switch means to perform change actuation corresponding to a window pulse signal from said eccentric detection means, and to change said tracking driving signal to a jump pulse of the shape of said pulse.

[Claim 4] An optical spot carries out tracking to said truck with an actuator inside optical pickup prepared in radial [of a disc-like optical disk] movable. It is at a generation method of a tracking driving signal for moving to other trucks from a certain truck. The amount of reflected lights reflected across said truck of a light beam which carried out outgoing radiation along a truck on a recording surface of said optical disk from said optical pickup is detected. A tracking driving signal is generated from a tracking error signal generated based on the difference. A jump pulse of the shape of a pulse for making coincidence jump said optical pickup is generated to central value of said drive signal wave form. In a method of changing the tracking driving signal concerned to said jump pulse, and generating said tracking driving signal A generation method of a tracking driving signal which detects eccentricity of a truck on said disc-like optical disk, and is characterized by controlling a change to a jump pulse of the shape of said pulse based on eccentricity of said detected truck.

[Claim 5] A generation method of a tracking driving signal characterized by enabling a change to a jump pulse of the shape of said pulse in a generation method of a tracking driving signal indicated to said claim 4 only when eccentricity of said detected truck is within the limits of predetermined.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the track jump equipment and the generation method of a tracking driving signal of the optical pickup for making an optical spot jump to other trucks in the recording information regenerative apparatus of this optical disk especially about the recording information regenerative apparatus of the optical disk which reproduces recording information from the optical disk which is a disc-like information record medium.

[0002]

[Description of the Prior Art] The recording information regenerative apparatus of the optical disk which reads the recording information and is played from the optical disk which is the optical record medium which comes to form a pit in the surface of transparence disks, such as plastics, along a spiral track is already widely used as regenerative apparatus (for example, CD-ROM drive equipment etc.) of playback of music information etc., and the information record medium of a computer. Moreover, in recent years, the optical disk called DVD which increased the recording density to this optical disk, made a lot of information refreshable, and also enabled record of image information etc., and its regenerative apparatus are also appearing.

[0003] Also including the above-mentioned DVD optical disk, the optical disk which is this optical record medium forms a pit, and records information on the recording surface of a disc-like record medium, and information is usually recorded along the spiral track. And in the optical disk regenerative apparatus which reads recording information from this optical disk, and is reproduced, recording information is reproduced by reading a pit optically and reproducing this by the optical pickup prepared in radial [of an optical disk] movable, carrying out tracking on this track.

[0004] By the way, although the actuation called seeking (seek) which moves to other locations from a location with the optical disk which is a record medium is performed with the record signal-regeneration equipment of this optical disk, the dense retrieval and the track jump which usually moves an optical spot to other tracks following the rough retrieval which moves the optical pickup itself perform, and moving optical pickup to the target location is performed in that case. In addition, as what scans by the track jump in the record signal regeneration equipment of this optical disk, the "jumping scanner" is already known by JP,3-9554,B, for example.

[0005] namely, with conventional track jump equipment Detect the amount of reflected lights in the track both sides of the light beam which carried out outgoing radiation toward the track on an optical disk side from optical pickup, and the difference generates a tracking error signal. Although a light beam is made to follow on a track, driving a lens based on this tracking error signal Furthermore, the kick (jump) pulse of the shape of a pulse for making a light beam jump to an adjoining track is generated. Performing a track jump was performed by changing the tracking driving signal acquired from a tracking error signal to this kick pulse, and moving a lens.

[0006]

[Problem(s) to be Solved by the Invention] however, especially with the conventional technology mentioned above, when the spiral track on an optical disk side is carrying out eccentricity from the disk Since a low-frequency component is overlapped on the above-mentioned tracking error signal with the eccentricity of this track (it is remarkable when low-pass gain is especially raised in the pickup with low-pass low sensitivity), as shown also in attached drawing 7 Even if it generates a kick pulse to the central (center) value of a drive signal wave form It will be in the condition of having been buried in the tracking driving signal which consists of a low-frequency component of the tracking error signal produced with the above-mentioned eccentric track. Now It had to carry out repeatedly again, without the ability performing a jump to the extent that it expected, and the trouble that the attainment to the purpose location will be overdue was pointed out.

[0007] So, in this invention, it aims at the thing which can move the tracking location of optical pickup to an adjoining track and for which the track jump equipment and the generation method of a tracking driving signal of the improved optical pickup are offered at a high speed certainly in spite of the eccentricity of the spiral track on an optical disk side in view of the trouble in the above-mentioned conventional technology.

[0008]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, according to this invention, said optical spot carries out tracking to said track with an actuator inside optical pickup first prepared in radial [of a disc-like optical disk] movable. It is track jump equipment of optical pickup which moves to other tracks from a certain track. The amount of reflected lights reflected across said track of a light beam which carried out outgoing radiation along a track on a recording

surface of said optical disk from said optical pickup is detected. A means to generate a tracking driving signal from a tracking error signal generated based on the difference, A means to generate a jump pulse of the shape of a pulse for making said optical pickup jump to central value of said drive signal wave form. A means to have a means to change the tracking driving signal concerned to said jump pulse, and to drive said actuator, and to detect eccentricity of a truck on said disc-like optical disk further, Track jump equipment of optical pickup equipped with a means to control a change to a jump pulse of the shape of said pulse based on eccentricity of a truck from said eccentric detection means is offered.

[0009] Moreover, according to this invention, in track jump equipment of the aforementioned optical pickup, said eccentric detection means is constituted so that a window pulse signal which permits a change to said jump pulse for a tracking driving signal generated from said tracking error signal as compared with a predetermined threshold may be generated.

[0010] Furthermore, according to this invention, in track jump equipment of the aforementioned optical pickup, said change control means is equipped with a changeover switch means which changes said tracking driving signal to a jump pulse of the shape of said pulse, and said changeover switch means performs change actuation corresponding to a window pulse signal from said eccentric detection means, and changed said tracking driving signal to a jump pulse of the shape of said pulse.

[0011] In addition, in order to attain the above-mentioned purpose too according to this invention, an optical spot carries out tracking to said truck with an actuator inside optical pickup prepared in radial [of a disc-like optical disk] movable. It is at a generation method of a tracking driving signal for moving to other trucks from a certain truck. The amount of reflected lights reflected across said truck of a light beam which carried out outgoing radiation along a truck on a recording surface of said optical disk from said optical pickup is detected. A tracking driving signal is generated from a tracking error signal generated based on the difference. A jump pulse of the shape of a pulse for making coincidence jump said optical pickup is generated to central value of said drive signal wave form. In a method of changing the tracking driving signal concerned to said jump pulse, and generating said tracking driving signal Eccentricity of a truck on said disc-like optical disk is detected, and a generation method of a tracking driving signal which controls a change to a jump pulse of the shape of said pulse based on eccentricity of said detected truck is offered.

[0012] Moreover, according to this invention, in a generation method of the aforementioned tracking driving signal, only when eccentricity of said detected truck was within the limits of predetermined, a change to a jump pulse of the shape of said pulse was enabled.

[0013]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to an attached drawing.

[0014] First, a sign 10 is the optical disk of the disk configuration which is an optical information media, this optical disk 10 is rotating with a predetermined rotational speed by the motor 11 which is a rotation driving gear, and, as for this motor 11, that rotational speed is controlled [in / the whole recording information regenerative-apparatus configuration of the optical disk which equipped drawing 2 with the track jump equipment of the optical pickup which becomes the gestalt of operation of this invention is shown by the block diagram, and / drawing] through the roll control circuit 12. On the other hand, the information recording surface of this optical disk 10 is countered, the optical pickup 20 is formed, this optical pickup 20 contains the laser diode (LD) 21, a half mirror 22 and a lens 23, and the (Photodetector PD) 24 grade, and this optical pickup 20 is arranged forward and backward movable free by the actuator style which is not illustrated here radial [of the above-mentioned optical disk 10].

[0015] moreover, the signal detected by the photodetector 24 of the above-mentioned optical pickup 20 is amplified by pre amplifier 25, one side is led to the synchronous detector 30 as a RF signal, reading appearance is carried out, according to a transfer rate, ejection is performed for a fundamental-frequency component (primitive period), "0" and "1" discernment are performed for this primitive period as incorporation timing of input data, and a serial digital signal (EFM signal) is fabricated here. Further, error (error) correction and an EFM recovery will be performed by the latter digital disposal circuit 40, and this EFM signal will be outputted by this as playback data.

[0016] On the other hand, a tracking error signal and the signal taken out as a focal error signal among the signals detected by the photodetector 24 of the optical pickup 20 It is inputted into the servo circuit 50 for driving the optical pickup 20 after being amplified by the above-mentioned pre amplifier 25. To the motor 60 for pickup delivery which processing of here predetermined is performed and moves optical pickup 20 the very thing the tracking coil 61 which moves the lens 23 of the optical pickup 20 in the truck and the direction of an abbreviation right angle of an optical disk 10 electromagnetic, and performs tracking -- and The focal coil 62 for moving the objective lens 23 of the optical pickup 20 to the recording surface and perpendicular direction of an optical disk 10 electromagnetic, and securing a focus will be supplied, and these will be driven, respectively.

[0017] Attached drawing 3 shows concretely the structure of an actuator of moving the objective lens 23 of the optical pickup 20 in the truck and the direction of an abbreviation right angle of an optical disk 10 electromagnetic, and performing tracking in the driving means of these optical pickup 20. first, the line whose lenses 23 of the optical pickup 20 the so-called actuator structure of a spring method is shown in drawing 3 (A), and are two or more elastic bodies here as opposed to the pickup main part 201 -- the permanent magnet which is held with springs 202 and 202 and is not in the part a drawing example is attached. and the electromagnetism for the above-mentioned tracking to the perimeter of this objective lens 23 -- it makes it possible to move an objective lens 23 in the direction of a truck (level) according to the electromagnetic force (F) as shown by the arrow head all over drawing by arranging a coil 61 and impressing drive current (Itr) to this.

[0018] As structure of other actuators, moreover, in the so-called thing of an axial sliding method the objective lens 23 of the

optical pickup 20 is attached rotatable centering on the guide shaft 203 -- having -- **** -- too -- the above -- the same -- the electromagnetism for tracking -- by impressing drive current (I_{tr}) to a coil 61. It is possible to move the objective lens 23 of the optical pickup 20 according to the electromagnetic force (F) as shown by the arrow head all over drawing, rotating in the direction of a truck (level). In addition, the sign 204 in drawing is a balance weight.

[0019] In addition, although illustration is not carried out, probably, it will be clear by moving the objective lens 23 of the above-mentioned optical pickup 20 to the recording surface and perpendicular direction of an optical disk 10, and supplying drive current (I_f) to the above-mentioned focal coil 62 like the above also about the structure of a focal actuator too, that it is possible to give the force electromagnetic, to drive up and down, and to secure the focus of an objective lens 23.

[0020] Next, the track jump equipment of the above-mentioned optical pickup 20 which makes the feature of this invention is shown in drawing 1, and this is constituted including a part of above-mentioned photodetector 24 and above-mentioned servo circuit 50. It has been arranged before and behind the pit detecting element 241 which detects the reflected light from a pit according to a diffraction operation of light, and the above-mentioned pit detecting element 241, and it has been arranged and the photodetector 24 of the above-mentioned optical pickup 20 is equipped with the tracking detecting elements 242 and 243 which change and output the reflected light which received light to an electrical signal so that the reflected light may be received mutually across the track in which the pit was formed, so that clearly also from this drawing. And after that, it is led to the subtraction machine 51, those difference is computed here, and the detecting signal from the tracking detecting elements 242 and 243 of these pairs is outputted as a tracking error signal Ter .

[0021] It is led to the phase compensating network 52, phase compensation is performed, and the tracking error signal Ter which is the output of this subtraction machine 51 takes out a predetermined frequency component through the filter which is not illustrated further, and is outputted as a tracking driving signal $Tact$. through a switching circuit 53, this tracking driving signal $Tact$ is led to a driver line 54, and carries out power amplification -- having -- the electromagnetism for the above-mentioned tracking -- it is led to a coil 61.

[0022] On the other hand, the jump voltage generating circuit 55 is established in juxtaposition in the phase compensating network 52, and, as for this jump voltage generating circuit 55, at least the above generates the pulse-like jump pulse JP by the jump command $Jinst$ from the central data-processing section (CPU) 70 which is a control section so that clearly also from drawing. The jump pulse JP from this jump voltage generating circuit 55 will be inserted to the tracking error signal Ter through the above-mentioned switching circuit 53 too controlled by CPU70, and a tracking jump will be performed by this.

[0023] By the way, along the spiral track TR , as shown in drawing 4, a pit is formed in the information recording surface of the optical disk 10 of the disk configuration which is the optical information media which reproduces information with the recording information regenerative apparatus of the optical disk which explained the configuration above, and information is recorded on it so that the so-called linear velocity may be fixed (CLV: Constant Linear Velocity). However, to the optical disk 10 of the above-mentioned disk configuration, eccentricity is carried out and the spiral track TR on this optical disk 10 may be formed, as an arrow head shows all over drawing (the direction of an arrow head of drawing). Thus, when Track TR is carrying out eccentricity to the optical disk 10, to the above-mentioned tracking error signal Ter , the phenomenon which is superimposed on an eccentric frequency component by the eccentricity of this track, and is detected arises. Generally, eccentric frequency is a higher harmonic which makes the rotational frequency of an optical disk fundamental frequency, and since rotational frequencies are several Hz - 10Hz of numbers, eccentric frequency turns into low frequency of several Hz - about 10Hz of numbers too. Therefore, this phenomenon is remarkable when low-pass is especially raised in the pickup with low-pass low sensitivity.

[0024] Then, according to this invention, the eccentric detector 80 is further formed so that clearly [above-mentioned drawing 1]. This eccentric detector 80 detects the eccentricity of a track from that tracking driving signal by considering the tracking driving signal $Tact$ from the above-mentioned switching circuit 53 as an input. In addition, since the tracking error signal Ter was overlapped on the low-frequency component when Track TR was carrying out eccentricity to the optical disk 10 of a disk configuration as stated also above, the phenomenon buried with the tracking driving signal $Tact$ with which the jump pulse JP from the jump voltage generating circuit 55, especially generated to the central value in the portion with the big amplitude is generated by the low-frequency component of the above-mentioned tracking error signal Ter was pointed out. Then, when predetermined eccentricity, i.e., the amplitude of the low-frequency component of the above-mentioned tracking driving signal $Tact$, exceeds a predetermined threshold (V_{th}), generating of this jump pulse JP is forbidden, and only when this value does not exceed said threshold (V_{th}), it is made to generate the jump pulse JP in this invention.

[0025] If this is further explained to details, when Track TR is carrying out eccentricity in the signal wave form shown in attached drawing 5, the tracking driving signal $Tact$ from the above-mentioned switching circuit 53 produces vibration according to the eccentricity, as shown in drawing 5 (A). Then, as this tracking driving signal $Tact$ is considered as an input and shown in drawing 5 (B) as compared with a predetermined threshold (V_{th}), the eccentric detector 80 changes window pulse signal WP into "ON" condition, and only the range where the amplitude of the tracking driving signal $Tact$ is smaller than that threshold (V_{th} , $-V_{th}$) changes it into "OFF" condition, when larger than another side and a threshold (V_{th} , $-V_{th}$). That is, when window pulse signal WP shown in this drawing 5 (B) is "ON", impression of the jump pulse JP is permitted, and when another side and window pulse signal WP are "OFF", impression of this jump pulse JP is forbidden.

[0026] Then, by considering as an input window pulse signal WP outputted from this eccentric detector 80, when that window pulse signal WP is ON, the above CPU 70 changes a switching circuit 53, and inserts the jump pulse JP from the jump voltage generating circuit 55 in the tracking driving signal $Tact$. Thereby, as shown in drawing 5 (C), it enables the jump pulse JP inserted in the tracking driving signal $Tact$ to move the optical pickup 20 to the track which kicks and adjoins certainly,

without being buried in a driving signal.

[0027] An example of the internal-circuitry configuration of the jump voltage generating circuit 55 which generates the above-mentioned jump pulse JP is shown in drawing 6 . Here, this jump voltage generating circuit 55 generates the jump pulse JP which changes from positive [to illustrate] to negative to the outgoing end of an operational amplifier OP by having switches SW1 and SW2 and Resistance R, corresponding to the jump command signal Jinst from the above CPU 70, and changing a switch SW2 to the current source (I1, I2) from which the direction of current differs, and an operational amplifier OP one by one. In addition, ** which replaces with this circuit and adopts other jump voltage generating circuits is possible.

[0028]

[Effect of the Invention] According to the track jump equipment of the optical pickup which becomes this invention, so that clearly also from the above detailed explanation A jump pulse is buried with an eccentric truck and the jump which is like which expected] cannot be performed. The delay of the attainment to the purpose location by repeating a track jump again and performing it is canceled. In spite of the eccentricity of the spiral truck on an optical disk side It makes it possible to move the tracking location of optical pickup to an adjoining truck, it has it in a high speed, and certain and the outstanding effect of improving the seeking speed of the recording information regenerative apparatus of an optical disk are demonstrated.

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TECHNICAL FIELD

[The technical field to which invention belongs] This invention relates to the track jump equipment and the generation method of a tracking driving signal of the optical pickup for making an optical spot jump to other tracks in the recording information regenerative apparatus of this optical disk especially about the recording information regenerative apparatus of the optical disk which reproduces recording information from the optical disk which is a disc-like information record medium.

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PRIOR ART

[Description of the Prior Art] The recording information regenerative apparatus of the optical disk which reads the recording information and is played from the optical disk which is the optical record medium which comes to form a pit in the surface of transparence disks, such as plastics, along a spiral truck is already widely used as regenerative apparatus (for example, CD-ROM drive equipment etc.) of playback of music information etc., and the information record medium of a computer. Moreover, in recent years, the optical disk called DVD which increased the recording density to this optical disk, made a lot of information refreshable, and also enabled record of image information etc., and its regenerative apparatus are also appearing.

[0003] Also including the above-mentioned DVD optical disk, the optical disk which is this optical record medium forms a pit, and records information on the recording surface of a disc-like record medium, and information is usually recorded along the spiral truck. And in the optical disk regenerative apparatus which reads recording information from this optical disk, and is reproduced, recording information is reproduced by reading a pit optically and reproducing this by the optical pickup prepared in radial [of an optical disk] movable, carrying out tracking on this truck.

[0004] By the way, although the actuation called seeking (seek) which moves to other locations from a location with the optical disk which is a record medium is performed with the record signal-regeneration equipment of this optical disk, the dense retrieval and the track jump which usually moves an optical spot to other trucks following the rough retrieval which moves the optical pickup itself perform, and moving optical pickup to the target location is performed in that case. In addition, as what scans by the track jump in the record signal regeneration equipment of this optical disk, the "jumping scanner" is already known by JP,3-9554,B, for example.

[0005] That is, with conventional track jump equipment, the amount of reflected lights in the truck both sides of the light beam which carried out outgoing radiation toward the truck on an optical disk side from optical pickup is detected, and it is the difference. Although the light beam was made to follow on a truck, having generated the tracking error signal and driving a lens based on this tracking error signal, performing a track jump was performed by generating the kick (jump) pulse of the shape of a pulse for making a light beam jump to an adjoining truck further, changing the tracking driving signal acquired from a tracking error signal to this kick pulse, and moving a lens.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to the track jump equipment of the optical pickup which becomes this invention so that clearly also from the above detailed explanation, it is an eccentric truck. A jump pulse is buried, the jump it is [jump] like which expected] cannot be performed, but the delay of the attainment to the purpose location by repeating a track jump again and performing it cancels, it makes it possible to move the tracking location of optical pickup to an adjoining truck, it has it in a high speed, and certain and the outstanding effect improve the seeking speed of the recording-information regenerative apparatus of an optical disk demonstrate in spite of the eccentricity of the spiral truck on an optical disk side.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] however, especially with the conventional technology mentioned above, when the spiral track on an optical disk side is carrying out eccentricity from the disk Since a low-frequency component is overlapped on the above-mentioned tracking error signal with the eccentricity of this track (it is remarkable when low-pass gain is especially raised in the pickup with low-pass low sensitivity), as shown also in attached drawing 7 Even if it generates a kick pulse to the central (center) value of a drive signal wave form It will be in the condition of having been buried in the tracking driving signal which consists of a low-frequency component of the tracking error signal produced with the above-mentioned eccentric track. Now It had to carry out repeatedly again, without the ability performing a jump to the extent that it expected, and the trouble that the attainment to the purpose location will be overdue was pointed out.

[0007] So, in this invention, it aims at the thing which can move the tracking location of optical pickup to an adjoining track and for which the track jump equipment and the generation method of a tracking driving signal of the improved optical pickup are offered at a high speed certainly in spite of the eccentricity of the spiral track on an optical disk side in view of the trouble in the above-mentioned conventional technology.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, according to this invention, said optical spot carries out tracking to said truck with an actuator inside optical pickup first prepared in radial [of a disc-like optical disk] movable. It is track jump equipment of optical pickup which moves to other trucks from a certain truck. The amount of reflected lights reflected across said truck of a light beam which carried out outgoing radiation along a truck on a recording surface of said optical disk from said optical pickup is detected. A means to generate a tracking driving signal from a tracking error signal generated based on the difference, A means to generate a jump pulse of the shape of a pulse for making said optical pickup jump to central value of said drive signal wave form, A means to have a means to change the tracking driving signal concerned to said jump pulse, and to drive said actuator, and to detect eccentricity of a truck on said disc-like optical disk further, Track jump equipment of optical pickup equipped with a means to control a change to a jump pulse of the shape of said pulse based on eccentricity of a truck from said eccentric detection means is offered.

[0009] Moreover, according to this invention, in track jump equipment of the aforementioned optical pickup, said eccentric detection means is constituted so that a window pulse signal which permits a change to said jump pulse for a tracking driving signal generated from said tracking error signal as compared with a predetermined threshold may be generated.

[0010] Furthermore, according to this invention, in track jump equipment of the aforementioned optical pickup, said change control means is equipped with a changeover switch means which changes said tracking driving signal to a jump pulse of the shape of said pulse, and said changeover switch means performs change actuation corresponding to a window pulse signal from said eccentric detection means, and changed said tracking driving signal to a jump pulse of the shape of said pulse.

[0011] In addition, in order to attain the above-mentioned purpose too according to this invention, an optical spot carries out tracking to said truck with an actuator inside optical pickup prepared in radial [of a disc-like optical disk] movable. It is at a generation method of a tracking driving signal for moving to other trucks from a certain truck. The amount of reflected lights reflected across said truck of a light beam which carried out outgoing radiation along a truck on a recording surface of said optical disk from said optical pickup is detected. A tracking driving signal is generated from a tracking error signal generated based on the difference. A jump pulse of the shape of a pulse for making coincidence jump said optical pickup is generated to central value of said drive signal wave form. In a method of changing the tracking driving signal concerned to said jump pulse, and generating said tracking driving signal Eccentricity of a truck on said disc-like optical disk is detected, and a generation method of a tracking driving signal which controls a change to a jump pulse of the shape of said pulse based on eccentricity of said detected truck is offered.

[0012] Moreover, according to this invention, in a generation method of the aforementioned tracking driving signal, only when eccentricity of said detected truck was within the limits of predetermined, a change to a jump pulse of the shape of said pulse was enabled.

[0013]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to an attached drawing.

[0014] First, a sign 10 is the optical disk of the disk configuration which is an optical information media, this optical disk 10 is rotating with a predetermined rotational speed by the motor 11 which is a rotation driving gear, and, as for this motor 11, that rotational speed is controlled [in / the whole recording information regenerative-apparatus configuration of the optical disk which equipped drawing 2 with the track jump equipment of the optical pickup which becomes the gestalt of operation of this invention is shown by the block diagram, and / drawing] through the roll control circuit 12. On the other hand, the information recording surface of this optical disk 10 is countered, the optical pickup 20 is formed, this optical pickup 20 contains the laser diode (LD) 21, a half mirror 22 and a lens 23, and the (Photodetector PD) 24 grade, and this optical pickup 20 is arranged forward and backward movable free by the actuator style which is not illustrated here radial [of the above-mentioned optical disk 10].

[0015] moreover, the signal detected by the photodetector 24 of the above-mentioned optical pickup 20 is amplified by pre amplifier 25, one side is led to the synchronous detector 30 as a RF signal, reading appearance is carried out, according to a transfer rate, ejection is performed for a fundamental-frequency component (primitive period), "0" and "1" discernment are performed for this primitive period as incorporation timing of input data, and a serial digital signal (EFM signal) is fabricated here. Further, error (error) correction and an EFM recovery will be performed by the latter digital disposal circuit 40, and this EFM signal will be outputted by this as playback data.

[0016] On the other hand, a tracking error signal and the signal taken out as a focal error signal among the signals detected by

the photodetector 24 of the optical pickup 20 It is inputted into the servo circuit 50 for driving the optical pickup 20 after being amplified by the above-mentioned pre amplifier 25. To the motor 60 for pickup delivery which processing of here predetermined is performed and moves optical pickup 20 the very thing the tracking coil 61 which moves the lens 23 of the optical pickup 20 in the truck and the direction of an abbreviation right angle of an optical disk 10 electromagnetic, and performs tracking -- and The focal coil 62 for moving the objective lens 23 of the optical pickup 20 to the recording surface and perpendicular direction of an optical disk 10 electromagnetic, and securing a focus will be supplied, and these will be driven, respectively.

[0017] Attached drawing 3 shows concretely the structure of an actuator of moving the objective lens 23 of the optical pickup 20 in the truck and the direction of an abbreviation right angle of an optical disk 10 electromagnetic, and performing tracking in the driving means of these optical pickup 20. first, the line whose lenses 23 of the optical pickup 20 the so-called actuator structure of a spring method is shown in drawing 3 (A), and are two or more elastic bodies here as opposed to the pickup main part 201 -- the permanent magnet which is held with springs 202 and 202 and is not in the part a drawing example is attached. and the electromagnetism for the above-mentioned tracking to the perimeter of this objective lens 23 -- it makes it possible to move an objective lens 23 in the direction of a truck (level) according to the electromagnetic force (F) as shown by the arrow head all over drawing by arranging a coil 61 and impressing drive current (Itr) to this.

[0018] As structure of other actuators, moreover, in the so-called thing of an axial sliding method the objective lens 23 of the optical pickup 20 is attached rotatable centering on the guide shaft 203 -- having -- **** -- too -- the above -- the same -- the electromagnetism for tracking -- by impressing drive current (Itr) to a coil 61 It is possible to move the objective lens 23 of the optical pickup 20 according to the electromagnetic force (F) as shown by the arrow head all over drawing, rotating in the direction of a truck (level). In addition, the sign 204 in drawing is a balance weight.

[0019] In addition, although illustration is not carried out, probably, it will be clear by moving the objective lens 23 of the above-mentioned optical pickup 20 to the recording surface and perpendicular direction of an optical disk 10, and supplying drive current (If) to the above-mentioned focal coil 62 like the above also about the structure of a focal actuator too, that it is possible to give the force electromagnetic, to drive up and down, and to secure the focus of an objective lens 23.

[0020] Next, the track jump equipment of the above-mentioned optical pickup 20 which makes the feature of this invention is shown in drawing 1, and this is constituted including a part of above-mentioned photodetector 24 and above-mentioned servo circuit 50. It has been arranged before and behind the pit detecting element 241 which detects the reflected light from a pit according to a diffraction operation of light, and the above-mentioned pit detecting element 241, and it has been arranged and the photodetector 24 of the above-mentioned optical pickup 20 is equipped with the tracking detecting elements 242 and 243 which change and output the reflected light which received light to an electrical signal so that the reflected light may be received mutually across the truck in which the pit was formed, so that clearly also from this drawing. And after that, it is led to the subtraction machine 51, those difference is computed here, and the detecting signal from the tracking detecting elements 242 and 243 of these pairs is outputted as a tracking error signal Ter.

[0021] It is led to the phase compensating network 52, phase compensation is performed, and the tracking error signal Ter which is the output of this subtraction machine 51 takes out a predetermined frequency component through the filter which is not illustrated further, and is outputted as a tracking driving signal Tact. through a switching circuit 53, this tracking driving signal Tact is led to a driver line 54, and carries out power amplification -- having -- the electromagnetism for the above-mentioned tracking -- it is led to a coil 61.

[0022] On the other hand, the jump voltage generating circuit 55 is established in juxtaposition in the phase compensating network 52, and, as for this jump voltage generating circuit 55, at least the above generates the pulse-like jump pulse JP by the jump command Jinst from the central data-processing section (CPU) 70 which is a control section so that clearly also from drawing. The jump pulse JP from this jump voltage generating circuit 55 will be inserted to the tracking error signal Ter through the above-mentioned switching circuit 53 too controlled by CPU70, and a tracking jump will be performed by this.

[0023] By the way, along the spiral truck TR, as shown in drawing 4, a pit is formed in the information recording surface of the optical disk 10 of the disk configuration which is the optical information media which reproduces information with the recording information regenerative apparatus of the optical disk which explained the configuration above, and information is recorded on it so that the so-called linear velocity may be fixed (CLV:Constant Linear Velocity). However, to the optical disk 10 of the above-mentioned disk configuration, eccentricity is carried out and the spiral truck TR on this optical disk 10 may be formed, as an arrow head shows all over drawing (the direction of an arrow head of drawing). Thus, when Truck TR is carrying out eccentricity to the optical disk 10, to the above-mentioned tracking error signal Ter, the phenomenon which is superimposed on an eccentric frequency component by the eccentricity of this truck, and is detected arises. Generally, eccentric frequency is a higher harmonic which makes the rotational frequency of an optical disk fundamental frequency, and since rotational frequencies are several Hz - 10Hz of numbers, eccentric frequency turns into low frequency of several Hz - about 10Hz of numbers too. Therefore, this phenomenon is remarkable when low-pass is especially raised in the pickup with low-pass low sensitivity.

[0024] Then, according to this invention, the eccentric detector 80 is further formed so that clearly [above-mentioned drawing 1]. This eccentric detector 80 detects the eccentricity of a truck from that tracking driving signal by considering the tracking driving signal Tact from the above-mentioned switching circuit 53 as an input. In addition, since the tracking error signal Ter was overlapped on the low-frequency component when Truck TR was carrying out eccentricity to the optical disk 10 of a disk configuration as stated also above, the phenomenon buried with the tracking driving signal Tact with which the jump pulse JP from the jump voltage generating circuit 55 especially generated to the central value in the portion with the big

TE sign

amplitude is generated by the low-frequency component of the above-mentioned tracking error signal T_{er} was pointed out. Then, when predetermined eccentricity, i.e., the amplitude of the low-frequency component of the above-mentioned tracking driving signal T_{act} , exceeds a predetermined threshold (V_{th}), generating of this jump pulse JP is forbidden, and only when this value does not exceed said threshold (V_{th}), it is made to generate the jump pulse JP in this invention.

[0025] If this is further explained to details, when Truck TR is carrying out eccentricity in the signal wave form shown in attached drawing 5, the tracking driving signal T_{act} from the above-mentioned switching circuit 53 produces vibration according to the eccentricity, as shown in drawing 5 (A). Then, as this tracking driving signal T_{act} is considered as an input and shown in drawing 5 (B) as compared with a predetermined threshold (V_{th}), the eccentric detector 80 changes window pulse signal WP into "ON" condition, and only the range where the amplitude of the tracking driving signal T_{act} is smaller than that threshold (V_{th} , $-V_{th}$) changes it into "OFF" condition, when larger than another side and a threshold (V_{th} , $-V_{th}$). That is, when window pulse signal WP shown in this drawing 5 (B) is "ON", impression of the jump pulse JP is permitted, and when another side and window pulse signal WP are "OFF", impression of this jump pulse JP is forbidden.

[0026] Then, by considering as an input window pulse signal WP outputted from this eccentric detector 80, when that window pulse signal WP is ON, the above CPU 70 changes a switching circuit 53, and inserts the jump pulse JP from the jump voltage generating circuit 55 in the tracking driving signal T_{act} . Thereby, as shown in drawing 5 (C), it enables the jump pulse JP inserted in the tracking driving signal T_{act} to move the optical pickup 20 to the truck which kicks and adjoins certainly, without being buried in a driving signal.

[0027] An example of the internal-circuitry configuration of the jump voltage generating circuit 55 which generates the above-mentioned jump pulse JP is shown in drawing 6. Here, this jump voltage generating circuit 55 generates the jump pulse JP which changes from positive [to illustrate] to negative to the outgoing end of an operational amplifier OP by having switches SW1 and SW2 and Resistance R, corresponding to the jump command signal J_{inst} from the above CPU 70, and changing a switch SW2 to the current source (I_1 , I_2) from which the direction of current differs, and an operational amplifier OP one by one. In addition, ** which replaces with this circuit and adopts other jump voltage generating circuits is possible.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the circuit block diagram showing the configuration of the track jump equipment of the optical pickup which becomes the gestalt of operation of this invention.

[Drawing 2] It is the block diagram showing the whole recording information regenerative-apparatus configuration of the optical disk equipped with the track jump equipment of optical pickup of above-mentioned this invention.

[Drawing 3] It is explanatory drawing showing the example of structure of the tracking actuator in the track jump equipment of the recording information regenerative apparatus of the above-mentioned optical disk.

[Drawing 4] It is explanatory drawing explaining the eccentricity of the truck in the optical disk side of the disk configuration which is the optical information media which reproduces information with the above-mentioned recording information regenerative apparatus.

[Drawing 5] It is the signal waveform diagram of each part for explaining the actuation in the track jump equipment of the optical pickup shown in above-mentioned drawing 1.

[Drawing 6] It is the circuit block diagram showing the concrete example of a configuration of the jump voltage generating circuit in the above-mentioned track jump equipment.

[Drawing 7] It is explanatory drawing to the tracking driving signal of the kick (jump) pulse by the eccentric truck in the conventional technology which is buried and explains a phenomenon.

[Description of Notations]

10 Optical Disk
20 Optical Pickup
23 Objective Lens
24 Photodetector
242 243 Tracking detecting element
51 Subtraction Machine
52 Phase Compensating Network
53 Switching Circuit
54 Driver Line
55 Jump Voltage Generating Circuit
61 Tracking Coil
70 Arithmetic and Program Control (CPU)
80 Eccentric Detector
Ter Tracking error signal
Tact Tracking driving signal
Jinst Jump command
JP Jump pulse
Vth, -Vth Threshold

[Translation done.]

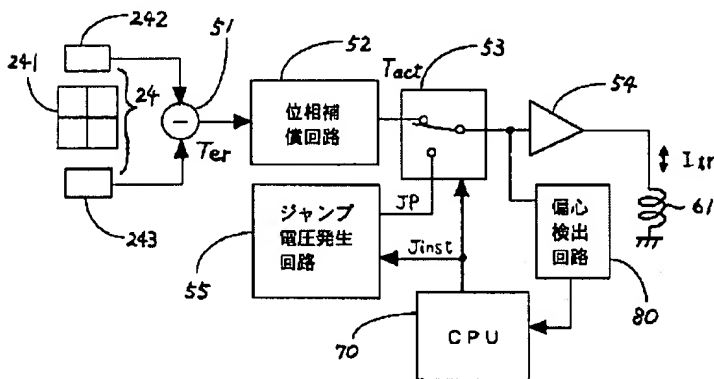
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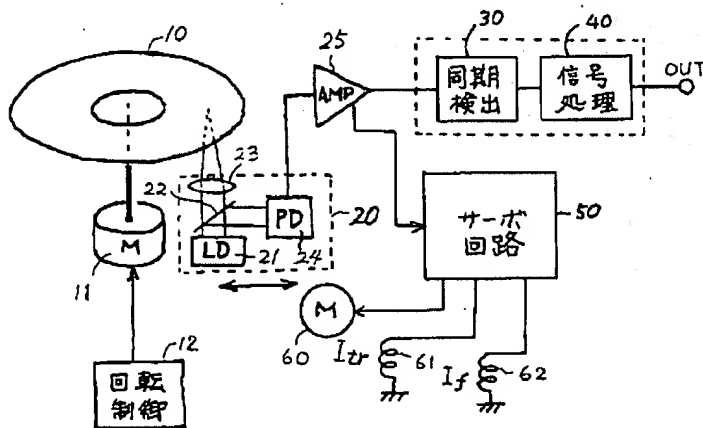
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DRAWINGS

[Drawing 1]

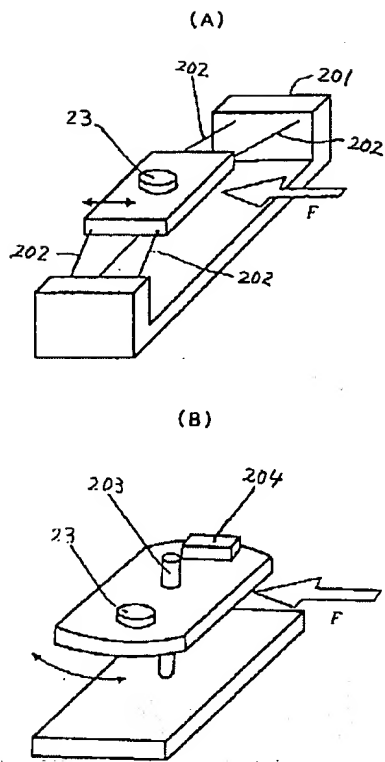


[Drawing 2]



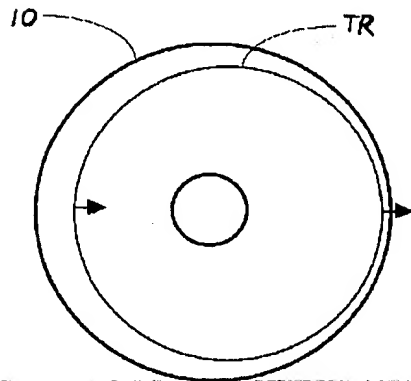
[Drawing 3]

図 3



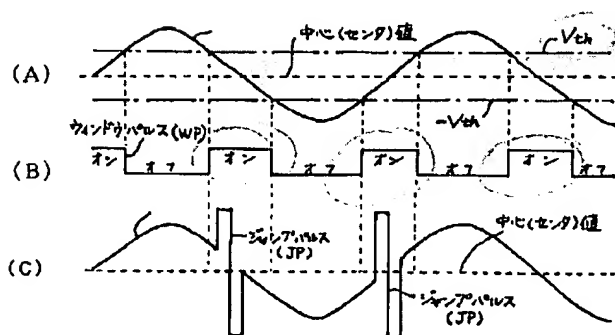
[Drawing 4]

図 4



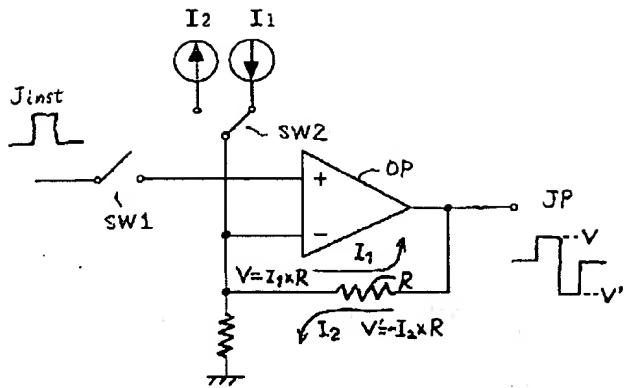
[Drawing 5]

図 5



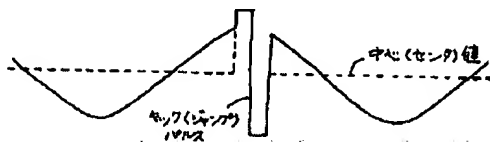
[Drawing 6]

図 6



[Drawing 7]

図 7



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CORRECTION OR AMENDMENT

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[Year copy format] Open patent official report 10-3126
[Filing Number] Japanese Patent Application No. 9-119813
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[FI]

G11B 7/085 H

[Procedure revision]

[Filing Date] September 12, Heisei 12 (2000. 9.12)

[Procedure amendment 1]

[Document to be Amended] Specification

[Item(s) to be Amended] The name of invention

[Method of Amendment] Modification

[Proposed Amendment]

[Title of the Invention] Track jump equipment and its track jump control method of optical pickup

[Procedure amendment 2]

[Document to be Amended] Specification

[Item(s) to be Amended] Claim

[Method of Amendment] Modification

[Proposed Amendment]

[Claim(s)]

[Claim 1] It is track jump equipment of optical pickup in which an optical spot which said optical pickup forms in a truck established in said disc-like optical disk with an actuator inside optical pickup prepared in radial [of a disc-like optical disk] movable carries out tracking and which it moves to other trucks from a certain truck,

A means to generate a tracking driving signal based on a tracking error signal with which a light beam which carried out outgoing radiation detects the amount of reflected lights reflected by truck of said optical disk, and is generated from said optical pickup, A means to generate a jump pulse of the shape of a pulse for making said optical spot jump, A means to drive said actuator based on said tracking driving signal or said jump pulse, An eccentric detection means to detect eccentricity of a truck on said disc-like optical disk, Track jump equipment of optical pickup characterized by controlling said change control means when a change control means which controls a change of said tracking driving signal or said jump pulse is established and eccentricity arises.

[Claim 2] It is track jump equipment of optical pickup characterized by being constituted so that a window pulse signal which permits a change to said jump pulse for a tracking driving signal with which said eccentric detection means was generated from said tracking error signal in track jump equipment of optical pickup indicated to said claim 1 as compared with a predetermined threshold may be generated.

[Claim 3] It is track jump equipment of optical pickup characterized by to equip said change control means with a changeover switch means for said tracking driving signal to a jump pulse of the shape of said pulse, and for said changeover switch means to perform change actuation corresponding to a window pulse signal from said eccentric detection means in track jump equipment of optical pickup indicated to said claim 2, and to change said tracking driving signal to a jump pulse of the shape

of said pulse.

[Claim 4] It is the track jump control method of optical pickup which an optical spot carries out tracking to said truck with an actuator inside optical pickup prepared in radial [of a disc-like optical disk] movable, and moves to other trucks from a certain truck,

A track jump control method of optical pickup characterized by controlling by said change control step when it has the following and eccentricity arises. A step which generates a tracking driving signal based on a tracking error signal with which a light beam which carried out outgoing radiation detects the amount of reflected lights reflected by truck of said optical disk, and is generated from said optical pickup A step which generates a jump pulse of the shape of a pulse for making said optical spot jump A step which drives said actuator based on said tracking driving signal or said jump pulse A step which detects eccentricity of a truck on said disc-like optical disk, and a change control step which controls a change of said tracking driving signal or said jump pulse

[Claim 5] A track jump control method of optical pickup characterized by enabling a change to a jump pulse of the shape of said pulse in a track jump control method of optical pickup indicated to said claim 4 when eccentricity of said detected truck is within the limits of predetermined.

[Procedure amendment 3]

[Document to be Amended] Specification

[Item(s) to be Amended] 0001

[Method of Amendment] Modification

[Proposed Amendment]

[0001]

[The technical field to which invention belongs] This invention relates to the recording information regenerative apparatus of the optical disk which reproduces recording information from the optical disk which is a disc-like information record medium.

[Translation done.]